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ECOLOGICAL OBSERVATIONS ON *Bombus jonellus* (Kirby) (Hym., Apidae) IN NORTHERN SCOTLAND

By MURDO A. MACDONALD
Dingwall Academy, Dingwall

Introduction

Bombus jonellus (Kirby) is one of the less familiar British bumble-bees, regarded by Williams (1982) as local but widespread over Britain as a whole, and by Prys-Jones and Corbet (1987) as 'very patchy'. Archer (1998) classed it as 'universal' in Britain (common throughout England, Wales and at least part of Scotland) on the basis of its post-1970 distribution, but this may be revised downwards in the light of recent habitat losses in England. It is known as a bee of heath and moorland, but there is little detailed information on its ecology in Britain. Hewson (1990) provided some insight into its foraging in northern Scotland. This paper contributes to the knowledge of the autecology of the bee in an area which is probably now its stronghold in the British Isles. Bee names follow Prys-Jones and Corbet (1987).

Methods

Details of all contacts with *B. jonellus* between 1988 and July 2000, including locality data, numbers, sex, caste, and forage plants used, were recorded. Encounters were non-systematic, and no transects or intensive observations were carried out. There is, therefore, no guarantee that data are fully representative of the species in all or any respects. Most observations are from the mainland of Highland Region, with some from the Western Isles, Inner Hebrides and Orkney in July and early August. The area covered was from sea-level to 1200m, and widely over Scotland north and west of the Great Glen, though not all parts and altitudinal bands were explored with equal effort. Occasional observations were made outside this area in inland areas of Grampian Region.

Castes of females were identified mainly on size. Some females were not classified, but in the light of subsequent experience it is probable that most were queens.

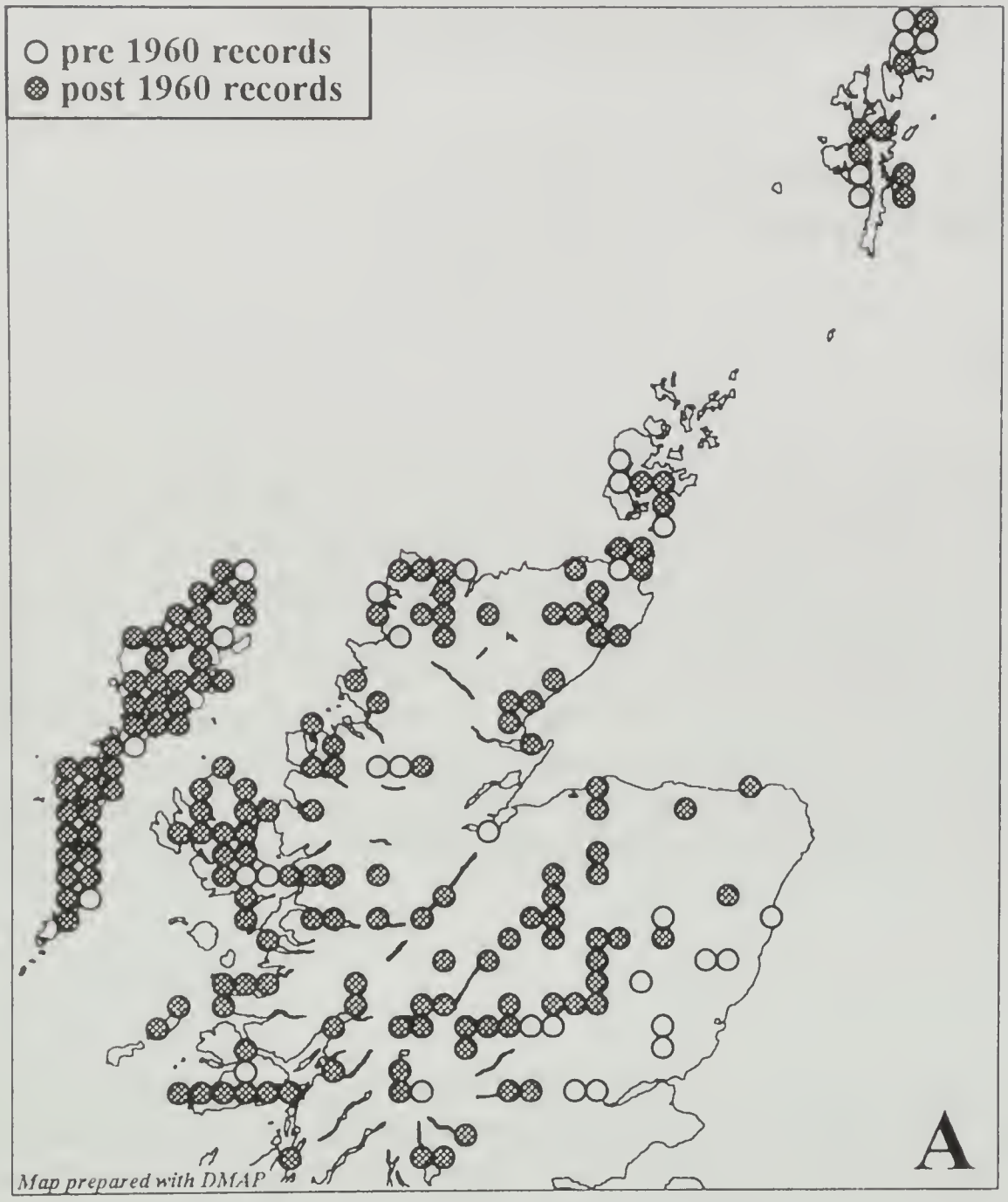

Figure 1

Distribution of *Bombus jonellus* in northern Scotland on the basis of 10km squares

A: Distribution from Alford (1980).

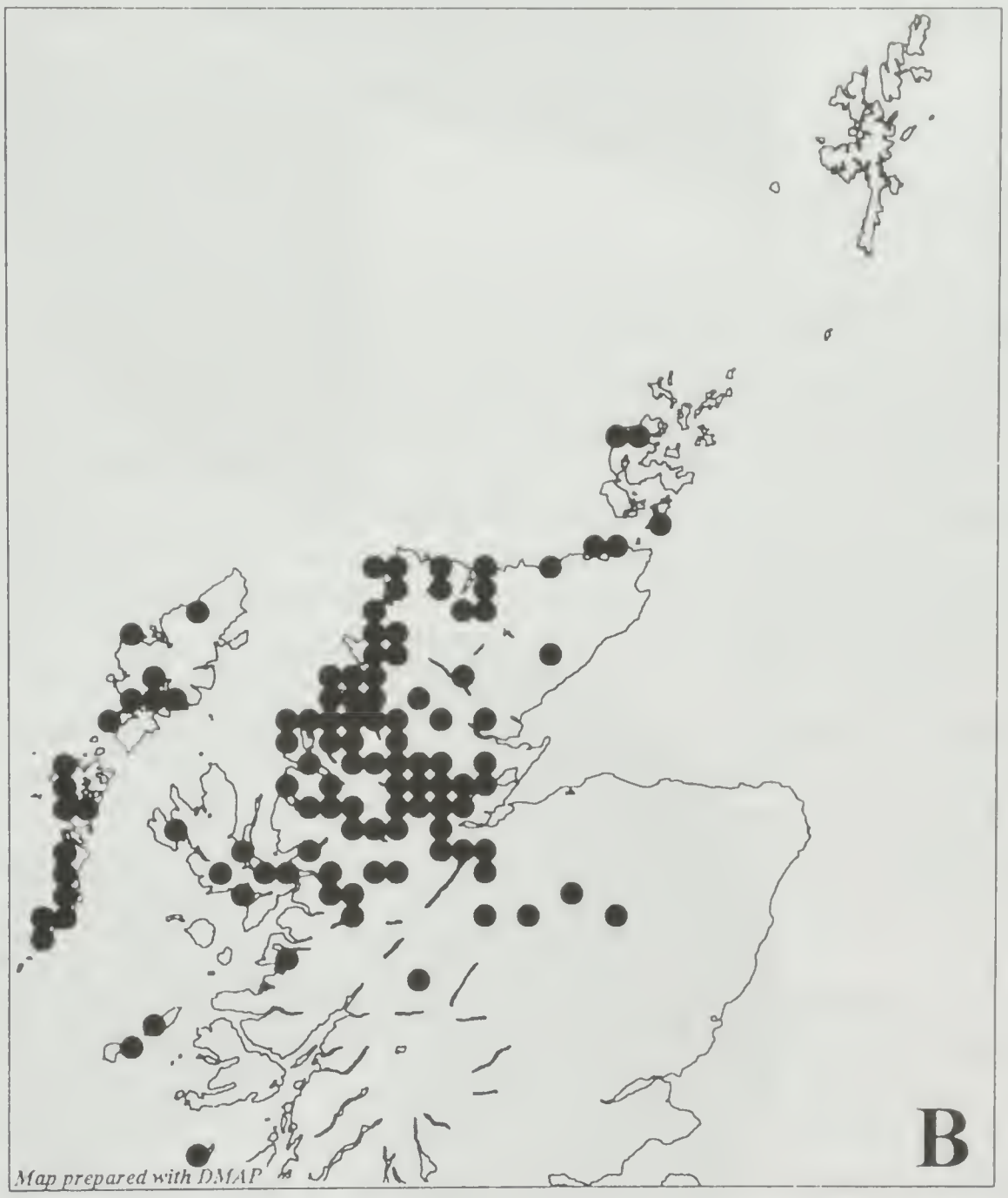

Figure 1

Distribution of *Bombus jonellus* in northern Scotland on the basis of 10km squares

B: Records from this study, 1988-2000.

A record is regarded as an encounter with any number of bees on one date at one locality.

RESULTS

Distribution and Habitat

The *Atlas of the Bumblebees of the British Isles* (Alford 1980) showed *jonellus* to be sparsely distributed in the north of Scotland on the mainland, with most records near to the coast and in the Grampian Highlands. On the islands, it was especially frequent on the Western Isles from Lewis to Barra, where it occurs as the reddish-tailed subspecies *hebridensis*. Figure 1 (A and B) shows this and the distribution of my own records, which are concentrated in more inland parts. Only 3 of 17 recently recorded 10km squares on the Western Isles (18%), and 19 of 33 (58%) near the west and north coasts of the mainland, were in 10km squares not recorded by Alford post-1960. However, 45 of 53 squares (85%) farther inland to the east where *jonellus* was recorded during this study were unrecorded by Alford. I do not regard this as evidence of any change in distribution in the 25 years since the Atlas fieldwork was completed, but assume rather that the more remote mountain country was not adequately surveyed then. The absence of recent records from the southern and eastern Highlands and from Shetland reflects a lack of coverage.

B. jonellus in the Highlands occupies two very distinct habitats. Over most of the range it occurs on Heather *Calluna vulgaris* moorland, and on the mountains above to 900m. In the west and on Orkney it is also found on meadows, especially on the rich machair on the west side of the Western Isles and west coast of the mainland, at less than 50m. (The general ecology of machair is described by Love, 1998).

Food

Figure 2 shows the food plants recorded for all female *jonellus* at mainland sites on or immediately adjacent to heather moor. A wide range of plant species was used by queens early in the season, but later the greatest reliance was on the two heaths *Erica cinerea* and *E. tetralix*, and on *Calluna*. For males, I have five records (16 individuals) on *Calluna* and three (10 individuals) on *E. cinerea*. Temporal analysis of the foods used shows the overwhelming importance of *Erica* and *Calluna* once these species came into flower from the end of June (Figure 3).

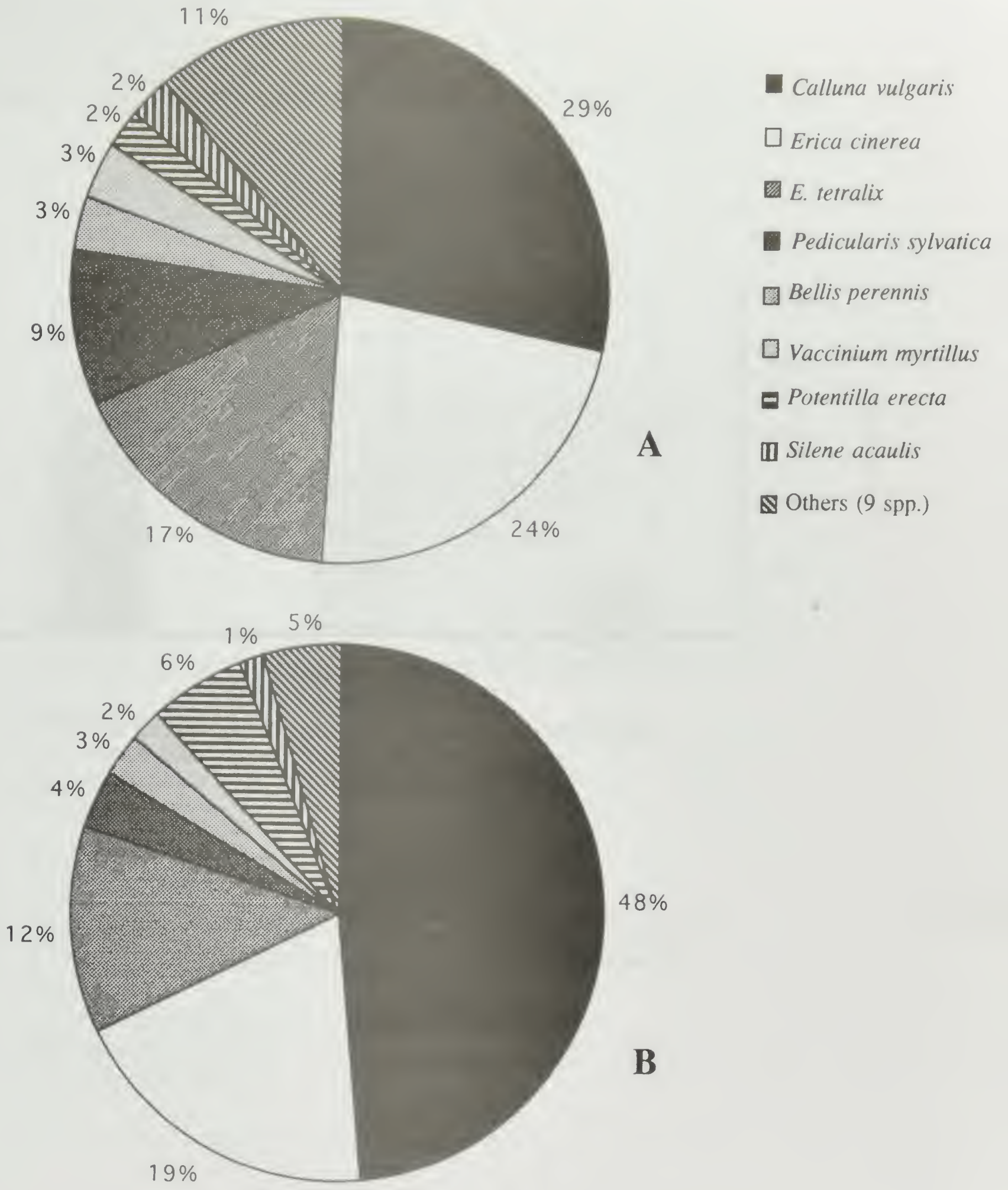

Figure 2

Plants used as forage by female *Bombus jonellus* on or adjacent to heather moor

A: Based on number of records (N=88).

B: Based on number of insects (N=235).

Data for the incomplete season of 2000 are not included.

The unspecified 'others' were: *Digitalis purpurea, Galium saxatile, Iris pseudacorus, Prunella vulgaris, Ranunculus ficaria, Taraxacum* agg, *Thymus polytrichus, Vaccinium vitis-idaea,* and *Veronica officinalis.*

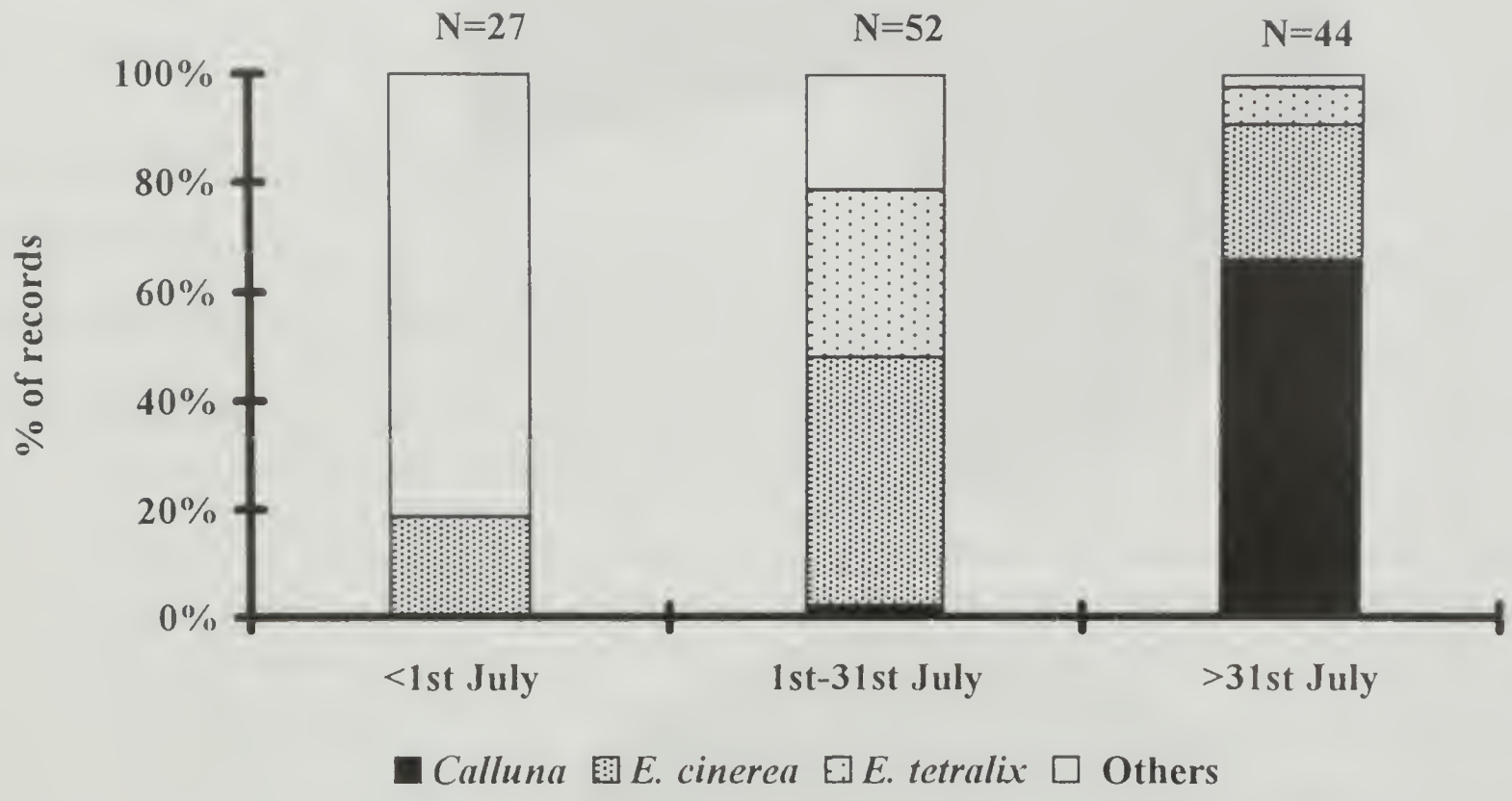

Figure 3

Temporal changes in the forage used by *Bombus jonellus* on moorland sites on the north Scottish mainland

Table 1

Forage use by *Bombus jonellus* on machair and meadow habitats compared with heather moorland on islands off N.W. Scotland on dates between 5th July and 10th August.
Some data are from Lynn Hughes (pers. comm.)

Plant Species	Number of insects recorded	
	Machair & meadow	Heather moor
Trifolium repens	22	
Odontites verna	15	
Senecio jacobaea	14	
Trifolium pratense	4	
Potentilla palustris	2	
Leontodon autumnalis	2	
Centaurea nigra	1	
Rhinanthus minor	1	
Erica cinerea		21
Erica tetralix		7
Fuchsia magellanica		4
Pedicularis palustris		1
Cirsium palustre		1

Where *Erica* is not available, *Thymus polytrichus* is important to queens. On 16th July 2000 at over 750m on Cul Mor in Wester Ross, at least 13 queens were feeding at *Thymus*, the only forage available. Lower down, all were on *Erica cinerea*. *Thymus* was also used by queens on machair at Redpoint near Gairloch on 21st July, while on the nearby moor all were on *E. tetralix*.

On machair and meadow sites the available foods are very different. Table 1 compares my relatively few forage records on the Western Isles, Summer Isles, Colonsay and Orkney, on machair and moorland during July and early August. The moorland forage use closely resembled that on the mainland at that time of year, but differed totally from machair forage. The *Fuchsia* record is not typical and refers to one site where a large clump grew adjacent to moorland in South Uist.

In all these analyses the data refer to forage use, and not preferences. Plant densities and relative rewards were not assessed.

Phenology

The seasonal pattern of activity on the mainland is shown in Figure 4. Extreme dates were 22nd April for the first queen, and 6th October for the last worker. Peak records of queens coincided with the flowering of *Erica*, and workers were active during the flowering period of *Calluna*. Queens prospecting or visiting possible nests were recorded between 16th May and 5th September, though in none of these cases was active nesting proven.

Observations on South Uist in the Western Isles suggest that nesting there is earlier than on the mainland, with workers recorded from 14th July to 7th August (unpublished observations by the author, Lynn Hughes and Mike Edwards). This does not represent the full season on the islands since observations did not extend beyond these dates. These are distinctly earlier than the records of workers on the mainland, where the earliest I have recorded was on 26th July. A similar trend is shown by *B. magnus* (personal observation).

Social Parasitism

It is possible that *B. jonellus* suffers to a small degree from the attentions of the brood-parasitic *Psithyrus sylvestris*. This bee is scarce in northern Scotland (I have recorded it in only eight 10km squares) and it is known to parasitise both *jonellus* and *B. pratorum* (Alford, 1980), the latter also showing a relatively restricted distribution in the area (Macdonald 1998). This makes the matching of distributions of host and parasite impossible. One record in particular, however, of

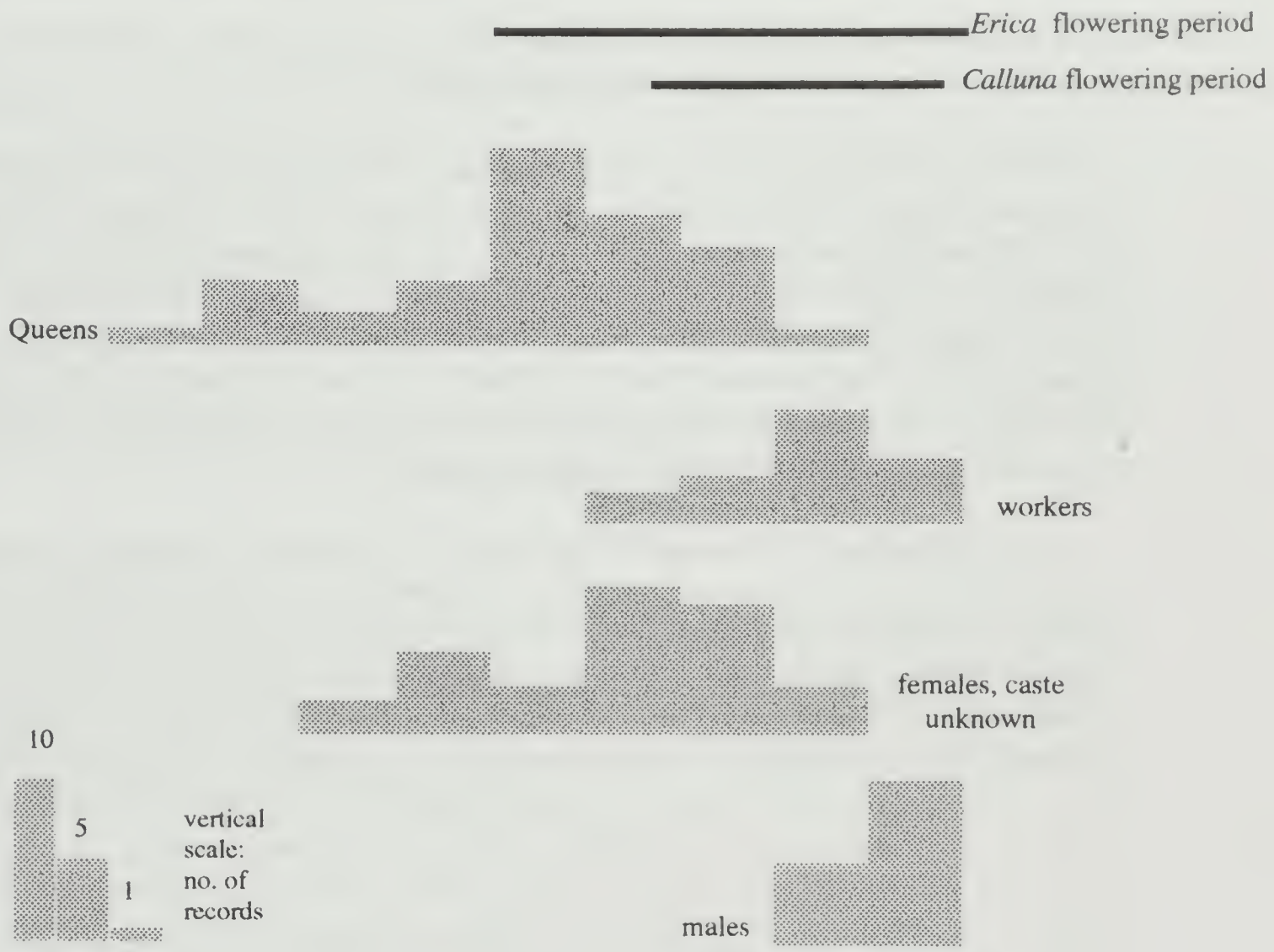

Figure 4

Phenology of *Bombus jonellus* on the mainland of Scotland

Many of the island data are from Lynn Hughes and Mike Edwards (pers. comms.).

at least six males in Glen Meanie (NH25) on 11th September 1994, where *jonellus* is common and *pratorum* unrecorded, suggests that *jonellus* may be a host here. Other records of *P. sylvestris* were in areas where, on distributional evidence, *pratorum* was the likely host, or where both *Bombus* spp. were known to occur.

DISCUSSION

Bombus jonellus occurs mainly on heather moorland, but also on machair and meadow habitats. The ecology in these two habitats is very different, reflecting their different floristic composition. Diet is obviously different, but there is also evidence that workers may be produced earlier on the machair. On moorland there is little forage to sustain workers until the *Calluna* blooms, and I believe that the conspicuously late season there is adapted to coincide with the late *Calluna* flowering. I would expect *jonellus* to occur anywhere in the north of Scotland where there is significant area of *Calluna* moorland.

The predominance of the two *Erica* heaths and *Calluna* as forage for *jonellus* in this study bears out the results of Hewson (1990) who found overall frequencies of visits at three study sites of 17%, 33% and 38% to *E. tetralix, E. cinerea* and *Calluna* respectively. John Crossley (personal communication) reports that in Orkney it is "catholic in its tastes earlier in the year" but feeds on *Erica* and *Calluna* in the late summer. Mike Pennington (personal communication) tells me that *jonellus* favours *E. cinerea* in Shetland where that flowers more readily than *Calluna.* It seems that throughout northern Scotland *jonellus* is strongly associated with these two genera, except where it occurs on machair and similar habitats. Without a detailed survey of relative densities and rewards for the two heaths, it is impossible to draw any conclusions as to why *tetralix* is usually less frequently visited than *cinerea. B. jonellus* is a short-tongued bee (data from Finland quoted in Teräs, 1976) and *tetralix* has a longer corolla tube than *cinerea* (Hewson, 1990), so this may be a contributing factor.

The phenology of *jonellus* and other northern Scottish bees is characterised by asynchrony within the population. This applies to both island and mainland *jonellus.* In July 1998, on the South Uist machair, the populations of *jonellus, magnus, muscorum* and *distinguendus* all had, simultaneously, prospecting queens, foraging queens and foraging workers at different nests. Given the short season for bumblebees in northern Scotland - it finishes at the latest by mid-October - the possibility exists that some nests of these species may produce few or no workers. Observers should be aware of this phenomenon, and not assume (as has been done in the past) that fresh queens foraging for pollen rather late in the year are

preparing for a second brood. My experience suggests that bivoltine behaviour is, at best, exceptional here even in the lowland species of *Bombus*, and I have never suspected that any second broods have been produced from the occasional late queens which I have seen gathering pollen.

The apparently earlier appearance of workers on the islands is interesting. It is tempting to link this with the habitat difference and the more diverse forage available for a longer season on the machair of the islands. Further studies on the island populations are required to establish whether the moorland and machair bees there are confined to the separate habitats, or move from one to the other following changes in available forage. All five *Bombus* in the Western Isles (the four mentioned above, and *B. hortorum*) occur commonly on machair, mainly on the west side, and, except for *distinguendus,* also on moorland in central and eastern parts. In many places there is little distance to separate them, and it would be entirely credible that the bees move freely between the two. To clarify this would, however, require fairly intensive study.

Acknowledgements

I am grateful to Dr. Philip Entwistle for records from his collection; to Miss Lynn Hughes, who provided much of the data from the machair of South Uist; to Mr. Mike Edwards for providing his Scottish records; and to Mr. John Crossley for information from Orkney. Dr. M.E. Archer and Mr. Mike Edwards made useful comments on a draft of the paper.

Summary

Bombus jonellus in northern Scotland is distributed over the heather moorland of the mainland and the islands, and, on the Western Isles especially, also on coastal machair. Forage on moorland is dominated by heaths *Erica* spp. and Heather *Calluna vulgaris*, though queens take a greater variety early in the summer. Forage on machair is more diverse. It is suggested that the late season is timed to exploit the late flowering *Calluna*, and that workers may emerge earlier in island machair and meadow habitats.

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ARDNAHEIN 1997

By FRANK NEWALL
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and ELIZABETH B. RENNIE
Cowal Archaeological and Historical Society

Introduction

The name 'Ardnahein' currently relates to a farm one mile south-east of Carrick Castle on Loch Goil. Previous to the 20th century the name belonged to a large township situated almost half a mile further to the south-east, at the junction of Loch Goil and Loch Long. The township was probably abandoned in the middle of the 19th century. The houses are now very ruinous and are engulfed in a mattress of bracken. The old buildings and yards are set on each side of a burn known as the 'Allt Reinain' and below a hill called the 'Cnoc Reinain'.

The situation of the township is immediately under Cnoc Reinain and under the 400 m ridge of hill which divides Loch Goil from Glen Finnart. It is set on a 'fan' of alluvial soil which stretches from the base of the hill 150 m to the loch shore, and north to south for 300 m above the shore-line. There are two further promontories carrying good alluvial soil to the north which would have provided agricultural land. On one of these the present farm of Ardnahein has been built. The rest of the surrounding land is mountainous and craggy, falling in near vertical rocks to the lochside and rising in steep gradients to the summits at 400 m.

Ninian

According to Watson (1926) and McLean (c.1970) the three names Ardnahein ('Ardnanyne' in a charter of 1673), Allt Reinain and Cnoc Reinain, all derive from Ninian. It therefore seemed reasonable to look in the area for a site which might have been an Early Christian foundation. Features were found which did not appear to relate to the township and were therefore investigated (Figure 1).

The Features

The Enclosure

After clearing the bracken, a feature unlike the township foundations, and using a different method of construction, was discovered. It was a small enclosure set on

Figure 1

Opposite; page 17.

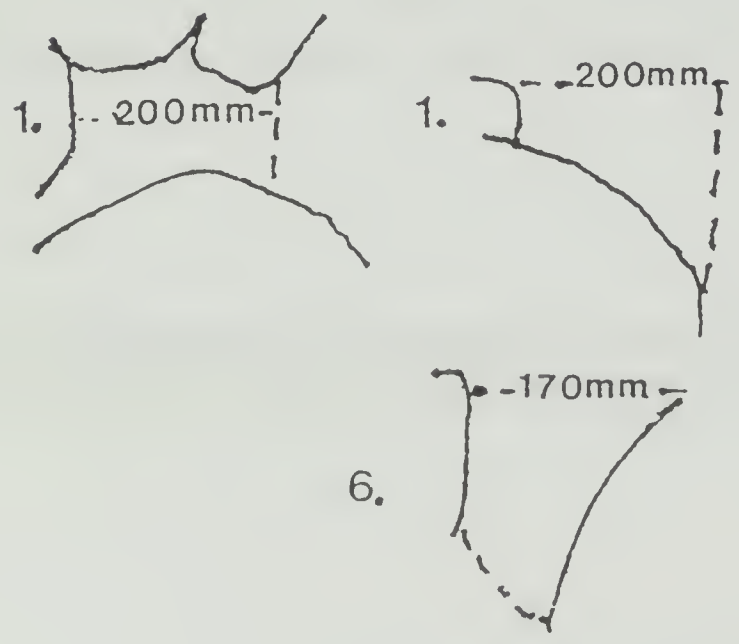
ARDNAHEIN
NS 20559313

The Enclosure, Circular Cobbling, External Mounds, and Terrace

---

Post-Hole Dimensions
Pages 19-22.

1. 0.20m across, 0.16m deep.
2. 0.12m square, 0.12m deep.
3. 0.12m square, 0.12m deep.
4. 0.12m square, 0.12m deep.
5. 0.20m diameter, 0.15m deep; within rosette of stones.
6. 0.17m across, 0.20m deep.
7. 0.13m square, 0.15m deep.
8. 0.13m square, 0.15m deep.
9. 0.17m square, 0.20m deep.
10. 0.15m diameter, 0.15m deep; charcoal in east arc.



Yard Dyke

Boulder Mound

1

2

3

4

5

6

7

8

9

10

the south side of the burn and showing evidence of having been undermined and partly destroyed by the burn. The enclosure was set on a terrace above and 50 m from the shore and adjacent to the lowest of the township yards.

The surrounding wall was not more than 0.5 m in height, built mostly of large rounded boulders, many of which appeared to be set in an upright position with others lying loosely against them. It formed a U-shaped feature 7.0 m in width internally and 5.0 m from the burn bank to the rounded south end. In the middle of the rounded end there was a gap, and adjacent to it an upright stone standing 0.8 m high. On the broken east side there appeared to be another gap in the wall.

Circular Cobbling

When the bracken had been cleared, a round cobbled area 2.5 m in diameter was uncovered on the floor of the Enclosure. Its appearance suggested that it was a stack-base, although the kerbing seemed to be too well and too carefully laid.

External Mounds

About 1.0 m and 2.0 m from the external east wall two low mounds or cairns of stone were set. They were diamond shaped; the more southerly 2.5 m long by about 1.0 m broad; the more northerly 1.5 m long by 0.75 m broad. The kerbing of the larger was well set, but grass and bracken had blurred the edges of the apparently smaller one. Neither was more than about 0.2 m high in the centre.

The Terrace

The Enclosure and the Mounds were set on a terrace which formed one end of a rectangle. The rectangular shape was formed by the river bank to the north, and two steep banks which fell away to 'machair' land on the shore. The burn bank was vertical and had been cut back by flood water. Both the vertical and the steeply sloping banks above the shore were about 3.0 m in height.

Any continuation of the south and west demarcation of the Terrace could only be postulated, since a stony mound and a dyke relating to the township overlay the ground in these areas. The extent of the Terrace which can be recognised is about 23 m by 11 m (253 sq. m). The surface of the Terrace is relatively level apart from a shallow curvilineal depression about 1.0 m wide, which curves round the mounds and extends partly along the south of the Enclosure.

Excavation

Circular Cobbling

A 1.0 m trench was taken across the Enclosure from west to east to include the area of Circular Cobbling. This was later enlarged to include the whole circle.

Close set stones formed a well built kerb surrounding the circle, except to the north where stones had been dislodged. A central depression gradually became visible outlined by the suggestion of internal kerbing. The original Circular Cobbling had now become a circular margin or border about 0.8 m wide around a depression. On the west arc the trench was deepened and the border removed. The border was found to have had a secondary layer of stones added to an original construction, since a thin layer of black peaty earth separated two courses of stone. The border was set on a heavier base, viz. - two boulders, each about 25 cm x 15 cm x 15 cm.

The central depression was scraped down, removing brown earth and uncovering large loose boulders which appeared to have been thrown in. These were removed, leaving a cavity which was nearly square (1.5 m by 2.0 m). Three boulders, one in the north-west corner and two on the east side, were earthbound though the top broke off the corner stone and one of the side stones (see Figure 2). Two large sherds of 16th century pottery were recovered from each side of one of the broken boulders.

The removal of more earth uncovered the floor of the cavity, which was now found to be only 1.0 m wide though still 2.0 m long. The floor was of hard packed earth 0.24 m below the ground surface. The original east side consisted of the two large boulders, and smaller packed stones. A slightly raised platform, which occupied one half of the south end, may have been duplicated at the north end, since a slightly higher floor level was removed from there, before reaching the real base. From these higher levels a refacing of the north and south ends of the cavity, of medium cobbles in brown clayey earth, sloped up to the surface. The weathered condition and red-brown staining of the cobbles suggested that they had been exposed to the air for some time. Three sides of the cavity consisted of large stones - boulders - with packing stones between. The fourth south side was well-built with courses of small stones - the top course forming the decorative border.

Under the re-surfacing levels at the north and south ends, in the corners of the original rectangular cavity, sockets were found. Three of these (Nos. 2, 3 and 4) were shallow and almost square - 0.12 m, and the same in depth. The socket in the

north-west corner (No. 1) was a pointed post-hole 0.2 m deep. However it is thought that it may originally have been 0.44 m deep, since the stone which broke during excavation may have formed an upper side to the hole. The four sockets did not form a true rectangle, since the pair to the north were 0.75 m apart and the pair to the south were 1.15 m apart (Figure 2).

The Enclosure

When the trench between the circular border and the wall of the Enclosure on the west side was deepened, the construction of the wall became apparent. The original wall had consisted of very large boulders - on average 0.8 m to 1.0 m in length and up to 0.5 m in width and depth. Many of these boulders had been set in an upright position on a base of flat stones which continued inside, as a scarcement. Lesser stones supported them on the inside, forming a wall about 1.0 m broad. The secondary thickening made the wall appear broader and less well built than the original construction. This double build was found when excavating the trench, but it was also noted during surface clearing around the perimeter.

The two openings which had suggested entrances proved on clearing to be paved with rounded stones which led into the Enclosure. The south entrance beside the upright stone was very distinct; it led on to a cobbled path which terminated at the decorative border of the cavity. The entrance to the east was less clear, though here also there was evidence of a short cobbled path which did not extend as far as post-hole No. 6. In the north-east area of the Enclosure there was a spread of packed stone. When first cleared, a well built curved kerb was uncovered but it only continued for about 3.0 m. Thereafter the stones had been greatly disturbed by tree roots; the north side of the packing may have fallen away with the burn bank. The stones did appear to have been set in position, and were more closely packed than the light cobbling which overlay the rest of the floor of the Enclosure. The packing of the stones resembled the packing of the two external mounds. No investigation was made to see what lay below, and no inner kerb was evident as had appeared initially in the Circular Cobbling.

No further trenches were made in the Enclosure but the floor was cleared of vegetation and loose earth. A light intermittent cobbling overlay the floor and two post-holes were found, Nos. 5 and 6. Of these, No. 6 was cut through the primary brown gravelly layer, and lay clear of the cobbling which edged to east and south of it. These post-holes may have held grave markers - posts, stones or crosses.

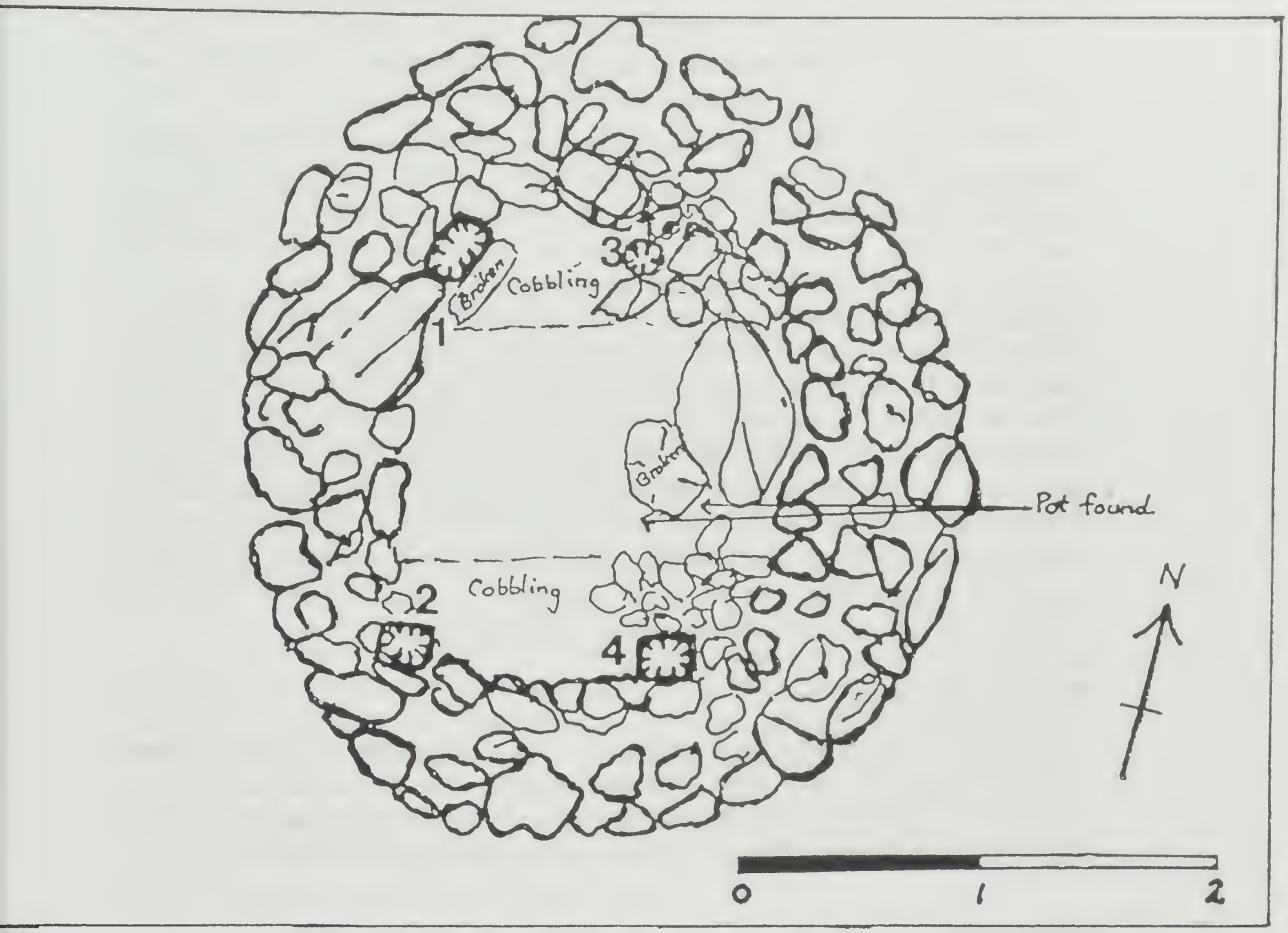


Figure 2

Circular Cobbling

'Stack-base' or 'Disc Cairn'

The Terrace

Two further trenches were cut in the Terrace, both about 3.0 m by 1.0 m wide (see Figure 1).

To the east, on the rim of the steep bank, a platform of stone was found immediately under the grass and bracken roots. In the 1.0 m wide trench the platform measured about 2.0 m long. In its centre there was a large rounded socket hole (No. 10) with a lens of charcoal at the side. Beyond the implied stockade the heavy cobbles continued to the edge of the scarp. The second trench was cut to investigate the slight depression which curved round the two Mounds. The trench was opened where the hollow terminated. Immediately under the grass, there was a kerbed stone setting which dipped towards the centre. In the centre were two sockets divided by packed stones which appeared to continue under the turf following the line of the ditch. These post-holes (Nos. 7 and 8) were squared and similar in size and depth. The more eastern had a thin edging of charcoal. Between the two sockets and 1.0 m to the north there was a third socket (No. 9), also squared but larger and deeper, which appeared to terminate the palisade against a slightly higher east-to-west alignment of larger stones. This is a secondary feature and the palisade must continue to the north.

External Mounds

The two Mounds were not investigated. The more southerly was well defined and heavily packed with stone. The smaller north mound was flatter and more scattered. A large thick ash tree root has grown along the side of the two cairns; it may have been the cause of the disturbance of the smaller mound (Figure 1).

Discussion

The proximity in a limited area of the place-names 'Ninian's Hill', 'Ninian's Stream', and 'Ninian's Ard' (or elevated area as distinct from hill), suggested an early Christian foundation.

Knight (1933, 1: 133) maps a stream of Ninianic sites along the Ayrshire coast, through Renfrewshire and via central Scotland up the east coast. The nearest site to Ardnahein is Ringangower near Dumbarton (Knight 1933, 1: 137) but in view of the British population of Cowal, part of which at least was included in the 6th century diocese of Strathclyde (Laing, 1977: 42, figure 9) the area was almost certainly included in Ninian's sphere of influence in the early half of the 5th century (MacQueen, 1961: 7-19).

Having recognised in the primitive wall a merely defining non-defensive structure, we expected to find a cell or oratory. Instead, just showing from beneath the peaty turf, was what appeared to be the kerb of a cobbled hay-stack base. Some credance to the suggestion was lent by the adjacent 18th-19th centuries settlement. However, in outlining the 'stack-base' with the trowel, we discovered that the peat cover pre-dated the township, since the upper 3.0 to 4.0 cm of peaty soil were liberally bestrewn with discarded broken glass, phials and crockery.

Before returning, therefore, to conduct limited excavation to determine the nature of the 'stack-base', we sought analogies for 'stack-bases' in relation to Early Christian sites. The results were surprising (see Appendix 1). Especially interesting was Gow's account (1890: 386) "At Bridge of Tilt there is a disused burying ground named 'Cladh Gille Andreas' (the burying place of St. Andrew's disciple). It is situated behind the Bridge of Tilt Hotel and is now used as a stack-yard. Some coffins and human bones have occasionally been found and the River Tilt which bounds it on the west, has no doubt, when in flood, carried away a considerable portion of it".

The association of 'stack-bases' and Early Christian sites was repeated elsewhere, as at Auch Gleann (R.C.A.H.M.S. 1975: 115, No. 219) where, in the circular enclosure near Allt na h'Annait, were "about half-a-dozen roughly circular heaps of stones between 1.8 m and 3.7 m in diameter which may be either field clearance-heaps or stack-bases; other examples occur outside the enclosure". At other sites, low mounds of stone were considered to be possible burial cairns, but on the Isle of May (Fife County Report) Yeoman (1996) recorded early Christian burials under one massive round platform cairn.

The results of our excavations indicate five phases in the history of the site (Figure 1).

Phase 1

The promontory on which the shrine was to be erected is defended on the north by the abrupt bank of the Allt Reinain; on the east by an abrupt scarp falling to the littoral shelf, and on the south by a dry valley which gradually rises from the beach.

This natural defence was reinforced by a stockade fronted by a shelf of large cobbles which closely follows the promontory edge. Across the level ground to the west the defence was probably a low bank, perhaps stockaded, which is largely

masked by the dykes of the later settlement, but appears to curve from beneath them towards a possible entrance to the south.

The stockade may have completely enclosed the site or it may have ceased against the river bank.

Within this defence was an inner palisade to enclose the sacred area (temenos) surrounding the shrine, which was itself enclosed by the stone wall. Entrance through the temenos and wall was on the south.

From the south entrance in the wall a causeway of large cobbles extended to the south end of a shallow burial cavity, which was probably covered by a shrine of the Totenmemoria type (Thomas, 1971: 148, figure 1b) rising from the sockets in the corners of the ossuary. From the largest corner post hole a grave marker may have risen higher, perhaps, in the absence of stone, a suitably engraved wooden memorial.

Laing (1977: 381) observes that no timber Totenmemoriae are as yet known from Britain, but they certainly existed. Bede, 731 A.D., records that Bishops Fursa and Chad were buried under house-shaped mortuaries (Colgrave and Mynors, 1969: 276, 344-347). His description of the latter's shrine could well be indicative of the ritual implied at Ardnahein by the approach causeway and the little cobbled platform in the south-east corner of the tomb.

> *"Est autem locus idem sepulchri tumba lignea in modum domunculi facta coopertus habente foramen in pariete per quod solent hi qui causa devotionis illo adveniunt manum suam inmittere ac partem pulveris inde adsumere"*
>
> (The burial place is covered by a wooden coffin, shaped like a little house with a small opening in the side through which devotees might insert their hands and remove a little of the dust).

For analogies for posts rising within the burial pit we have to turn to the continent (Thomas, 1971: 147-148). At Ardwell Isle, Kirkcudbright, where Knight (1933, 1: 135) lists a Ninianic site Ringuined, post-holes were interpreted as supporting a shrine above ground (Thomas, 1971: 73). Of Chad's tomb, Thomas stresses that its description as a little house implies both roof and walls, but this was the cover only, for direct contact with the sacred dust was allowed (Thomas, 1971: 147). We may further reason that to permit ready contact, the walls would require to rise straight from the burial pit, i.e. from sockets within it. Post-holes

outside would of necessity lie some distance from the side to prevent dislodging earth, and ready access from the sides of the superstructure would be hampered. We therefore suggest that the tombs of Lichfield and Ardnahein were similar. It is possible that, to prevent slip, the sides of the pit were at least partly timber-faced though the bottom lay open.

One further point should be noted. The sockets at Ardnahein indicate a structure tapering from south to north. While Thomas mentions that St. Cuthbert's coffin tapered, a feature "not derivable from Roman wood coffins in Britain" (Thomas, 1971: 147), little can be added. Thomas suggests a Gallic origin. At Whithorn, however, one early grave, No. 73, had a markedly trapezoidal timber lining (Hill, 1997: 72, figure 3.3).

With the corner marker post we may compare the cross-inscribed corner slab at 'Eithne's Grave', Eileach an Naoimh (Thomas, 1971: 62, figure 27), but there the grave lay within the area marked by the four slabs.

Grave markers in the early Christian period were not uncommon. At Whithorn (Hill, 1990: 6) in the 5th-6th centuries several graves "had possible stone holes towards the west end" while "stone packed sockets at the west ends of two graves may have held timber markers. One grave was covered with white granite and quartz cobbles".

At Ardnadam, Rennie (1984: 31) recorded grave markers, some inscribed, but in a more detailed paper (Rennie, 1999: figure 3) several grave pits are shown with marker sockets actually within the ends of the burial cavities. Associated with one important early grave there was an assemblage of quartz pebbles, possibly, as at Whithorn, to mark the grave of a religious leader.

Phase 2

At some time the north and south ends of the reliquary pit were refaced with cobbles in brown earth, possibly due to slip and the decay of any side boarding which may have been employed in Phase 1. However there was no trace of any debris; nor trace of carbon which might have resulted from such decay or from intrusive twigs, leaves, etc. We conclude that the chamber was not only well covered but kept clean. At this stage, with the sockets covered, any remains may have been translated to a fresh shrine over the cavity which, however, remained open.

It is possible at this time, post Ninianic, that a further grave was dug to the north-east of the original (see Appendix 2). Both inner and outer palisades probably functioned at this time.

Phase 3

In the 16th century the chamber was still open, as proved by the sherds found within it, edging the bottom cobbles of Phase 2, and was still clean. Then or shortly later it was filled with brown earth and boulders, and cobbled over by the circular capping to indicate a special grave shown by a marker post set up in post-hole 5. The grave to the north-east was probably similarly treated at this time. The site was then generally tidied and cobbled over.

By now the stockade and palisade were long abandoned, and it was possibly now that a flight of stone steps was built up on the north-east corner of the promontory - the top step being the cobbled shelf which had fronted the stockade. A secondary entrance was then broken through the east side of the stone wall, and an approach way to it, edged by heavy cobbles, passed over the palisade.

Phase 4

The graves were still venerated to the extent that, as peat began to encroach, additional stones were laid round the edge of the cobbling to provide an outer, slightly higher 'kerb'. These and other stones laid on top of the cobbling had a thin spread of peat beneath them. Other displaced stones were relaid against the inner face of the wall.

Phase 5

Presumably post-Reformation, and certainly by the time the 18th century settlement was established, the site was no longer respected. Discarded material was scattered freely over the site, and the wall became a favourite spot for lunching in the open. Against it, and even under later stones laid against it, were not only broken vessels but piles of sea shells.

Doubtless by this time the Allt Reinain had already eroded part of the north side of the enclosure. At least a third of the north/south axis is missing. Within the lost area there would have been space for a third burial or perhaps a small wooden oratory. However, as the final trowelling of the site was intended only to determine the extent of the cobbling and its relation to the low cairns, and to the heavily cobbled entrance causeway, any post-holes relative to Phases 1 and 2 may lie concealed beneath it.

The Function of the Site

The Ardnahein shrine was undoubtedly intended to attract pilgrims. By their presence, their festal celebration, and their attitude to the relics, to which an almost magical property was probably attributed, they would assist in evangelising the neighbourhood.

During the 5th century, when the shrine was possibly erected, Britain was by no means fully evangelised, although the Christian Church was officially recognised and organised by the beginning of the 4th century (Jones and Mattingly, 1990: 2, 95). Throughout the period numerous pagan altars, shrines, idols, and dedications were doubtless destroyed, but such was the multitudinous array of deities, at times symbiotic, of local spirits, and even unknown gods, that the task was formidable.

By the middle of the 6th century Gildas was able to write of "those diabolical idols of my country which almost surpassed in number those of Egypt and which we still see mouldering away within and without the deserted temples with stiff and deformed features" (cited by Knight 1933, 1: 345, note).

The aim was still destruction, and several papal letters to that end are recited by Bede, but among them, one of 601 A.D. from Pope Gregory (Colgrave and Mynors, 1969: 106-107) decreed that although the idols must be destroyed, the shrines should be retained and sanctified by the insertion of relics, and altars should be set up. The sacrifices formerly presented to idols should instead be prepared as food for the observance of religious feasts. The procedure was to sanctify the site and sublimate the rite. In this the cult of relics played an important part.

Laing (1977: 380) suggests that the veneration of relics reached Britain from the Mediterranean in the fifth century. Already at the beginning of the century the bones of St. Alban had been twice washed and translated, and in 429 A.D. the Gallic Bishops Lupas and Germanus visited his shrine (Salway, 1981: 466). Bede adds that Germanus had the tomb opened and added relics of the apostles and martyrs to St. Alban's bones (Colgrave and Mynors, 1969: 59).

Once established, the practice persisted until the Middle Ages and beyond. Do we not say 'Touch Wood'?

The Site Plan

The triple aspect exhibited at Ardnahein is apparently a sub-Roman development. Discussing the Romano-British temple, Jones and Mattingly (1990:

285) suggest that it should be considered as a representative of a widespread Gallo-British continuum. While we are concerned less with the temple than with its associated enclosure, we may trace their development within that continuum.

The pre-Roman Celtic site comprises a sacred focal point within a sacred enclosure or temenos. In the Roman period the shrine/temenos pattern is continued, but the object of veneration is included within the Romano-British temple. With this, however, we find associated structures. In the towns, for example, facing the temple across an open space, or arranged round the sides of that space, we have theatres, shops etc. (Wacher, 1974: 207, 210, 220 &c.). Thus a temple complex develops to cater for the large crowds drawn to a sacred site, and a recognised temple area or precinct develops. Beyond this, from the early third century A.D., an outer circuit was provided by the defensive town walls which were being erected.

In the country the tendency was to accept the circuit of an earlier temenos, replacing the shrine with the temple, and eventually with the precinct and associated buildings.

This we see developing at Uley (Jones and Mattingly, 1990: 295), where eventually, within the ditch of the earlier enclosure, half of the area is occupied by the temple precinct, the remaining space, no doubt, being available for assembly and for non-religious celebration.

Often the complex is sited within the defences of an Iron-Age fort, as at Maiden Castle (Salway, 1981: 338). The fully developed site could be seen at Lydney Park. There, not only was the temple precinct defined by guest houses, dormitories, and baths, but it was also enclosed by its own circuit wall within the Iron-Age defences. The many cult objects and the majority of coins found in this enclosure point to the activities associated with the religious practices observed on the site. Nevertheless, a gateway opened on to the northern half of the hill fort, where a sufficient number of finds pointed to temporary occupation. Throughout the existence of the temple complex, this outer area had the old Iron-Age defences refurbished. It was doubtless retained as an area for more secular assembly (Wheeler and Wheeler, 1932: 63, figure 1 and site plan).

Here, then, is the triple aspect of Ardnahein: the focal point, the sacred enclosure or precinct, and the outer enclosure. Granted the replacement of the pagan idols etc. with relics, or reliquaries, the observance of Christian ritual round the focal point, and the celebration of festal occasions in the outer enclosure, we see Ardnahein as a natural development in the sub-Roman extension of the Gallo-

British continuum. The same tripartite disposition pertains at the early shrine at Whithorn (Hill, 1997: 91-94).

With Ardnahein we may now compare Ardnadam, the other early Christian site of Cowal. Here Rennie (1999) has recorded, within the Iron Age dun walling, a palisaded enclosure with, towards the south end, four post-holes enclosing an area c. 1.0 m square, within which was a large squarish pit. It was suggested that the four posts may have supported the table for a portable altar. This does not account for the pit, and in the light of Ardnahein it is possible to suggest that at Ardnadam also, we have a reliquary site. Immediately beside it was a large grave pit, with a nearby assemblage of quartz pebbles, possibly indicating the burial of a religious leader. Further, as at Ardnahein, a cobbled path led from the entrance towards the possible grave. An additional feature was a line of posts along the east side of the path. One question cannot be answered without more extensive excavation than we planned, - was the outer stockade at Ardnahein an earlier feature?

Appendix 1

STACK BASES, CAIRNS AND EARLY CHRISTIAN SITES

The following list, confined to the west of Scotland, is by no means comprehensive, and is intended only to suggest the scope for research further to the results obtained at Ardnahein.

R.C.A.H.M.S. (1971. Argyll, Volume 1: Kintyre)

Kintyre, No. 279: **Kilchattan**. "This burial-ground is now marked only by a small turf-covered mound of stones".

Kintyre, No. 295: **Lag nan Clach**. ".....a small mound covered with turf, through which several large stones protrude; ....evidently the 'grave-mound' noted by Captain White before 1873".

R.C.A.H.M.S. (1975. Argyll, Volume 2: Lorn)

Lorn, No. 219: **Auch Gleann**. Within an enclosure, 27 m in diameter "about half-a-dozen roughly circular heaps of stones between 1.8 m and 3.7 m in diameter which may be either field clearance-heaps or stack bases; other examples occur outside the enclosure".

Lorn, No. 235: **Cladh Uaine**. ".....in the immediate vicinity of the building there are rigs and field clearance-heaps, together with what appear to be the remains of a shieling-hut".

Lorn, No. 271: **Port Maluag, Lismore**. "Towards the NE corner of the enclosure there is a mound of stones". Enclosure is 20 m by 10 m.

R.C.A.H.M.S. (1980. Argyll, Volume 3: Mull, Tiree, Coll &c.)

Tiree, No. 278: **Cornaigmore**. "An area of level ground in the SW corner of the former stackyard may represent the site of a burial-ground".

Mull, No. 321: **Port a' Chlaidh**. Towards the centre of the enclosure - a low circular mound about 2.0 m in diameter - also a few plain grave markers. Enclosure roughly oblong 21 m by 12 m within a dry-stone wall of 1.0 m.

R.C.A.H.M.S. (1984. Argyll, Volume 5: Islay, Jura, Colonsay, Oronsay)

Colonsay, No. 326: **Cill Chaitriona**. "There is a low stony mound opposite each end of the building, and at least two other similar mounds lie in the NE quarter of the enclosure".

Islay, No. 353: **Duisker** 2. "....a low stony mound immediately to the E of the chapel may mark the position of a grave".

Islay, No. 356: **Gleann na Gaoith'**. Enclosure 35 m by 11 m. "Immediately to the SE of the chapel there may be seen a roughly-built stone platform measuring about 2.8 m by 2 m over all. At the centre of the platform, which may mark a grave, there is a circular depression".

Islay, No. 383: **Nave Island**. "....there is a low rectangular platform, measuring about 3 m by 2.2 m, which is bounded by a kerb of basalt blocks and is covered with small stones including many white quartz pebbles. This platform may have marked a grave of special importance".

Colonsay, No. 390: **Teampull a' Ghlinne**. "To the s of the chapel there is a group of roughly circular mounds, possibly burial-cairns; the largest of them contains a short, narrow channel".

R.C.A.H.M.S. (1992. Argyll, Volume 7: Mid Argyll & Cowal)

Mid Argyll, No. 1: **Achadh na Cille, Ardminish**. "A low stony mound about 2.5 m in diameter, near the E boundary-wall, is presumably the 'small cairn, now nearly level' that was recorded in 1868".

Cowal, No. 56: **Kilbride, Strathlachlan**. "Some 2.5m N of the chapel there is an irregular stony mound about 4m from E to W by 3.6m, which was described by Knight as being 1.2m high, containing many white quartz pebbles and, at a depth of about 1.9m, 'flat hearth stones' ".

Mid Argyll, No. 70: **Inverlussa**. "In the enclosure there are a few small earthfast slabs and turf-covered mounds of stones".

Cowal, No. 99: **Stillaig**. "....a low heather-grown cairn 5m from the SE angle of the chapel may mark a burial".

Note. The cairns or 'stack-bases' resemble kerb cairns, but are generally smaller and lower than the usual kerb cairn of the Bronze Age. A typical example is suggested by Thomas's illustration (1994: 192, figure 11.4) of the Carnsew grave. The mound as drawn is, however, possibly higher than is warranted by the description, which refers to "a loose heap of stones the top of which was considerably beneath the surface of the soil".

To distinguish these cairns from the Bronze Age kerb cairns we suggest the term - 'disc cairn'.

We have subsequently visited two Early Christian sites:

a) **Auch Gleann** (Lorn 219) above.

b) **St. Fillan's**, near Dundurn, Strathearn.

a) **Auch Gleann** lies off the east bank of the Allt na h'Annait (the stream of the Mother Church) which flows from Coire na h'Annait (the corrie of the Mother Church), names which ensure early foundations.

The site is a subrectangular area, bounded by a ruinous stone wall in which an entrance gap lies towards the west end of the north side. Within are several low rough cairns.

Through the entrance a track passes from NNE for a short distance within to where, on its left side, are two of the low cairns apparently marked by a conspicuous boulder. But closer to this boulder, and barely discernible through the turf, is a low round cobbled area almost certainly covering a primary interment.

The other cairns are rougher in appearance, and at least two appear to cover filled cavities.

A low rectangular foundation to the south-east is traditionally referred to as a chapel.

b) **St. Fillan's**, as described by Alcock, Alcock and Driscoll (1990: 196), is "a very ruinous embanked enclosure of oval plan" which "may mark the site of an ecclesiastical enclosure contemporary with the occupation of Dundurn", a Dark Age fortification which they date by excavation to c.600-900 A.D. (1990: 198-214).

Within this enclosure, just to the left of the entrance in the south, is a circular patch of cobbling on which, close to the circumference, stands a small pillar stone

bearing two sockets in the face, one being distinctly cupped. This held a handful of coins, possibly perpetuating a long-established practice of devotion. For photograph and comment see Weir (1998: 419-420).

While the patch of cobbling is kept clear because of the use of the pillar stone, the edge of a larger circular area, some eight feet (2.44 metres) across, may be traced beneath a thin cover of turf.

In these two sites, the circular grass-grown cobbled areas are strictly analagous with the one excavated at Ardnahein. The fact that all three have but a thin cover of turf suggests that all for a considerable time may have been kept clear.

Appendix 2

THE LOCHGOILHEAD STONE

In Lochgoilhead Parish Church an Early Christian stone is preserved (R.C.A.H.M.S. 1992: 194, No. 87). Since the inscription includes ogham, this stone would be dated later in the 5th century than the site at Ardnahein, and possibly in the 6th century.

There is no trace at Lochgoilhead of an early church, nor is there a tradition of such. The earliest church recorded is of the last quarter of the 14th century. The patronage of the rectory was held by the Campbells of Lochawe, and in 1441 Duncan Campbell assigned their revenues to his new collegiate chapel at Kilmun.

It was possibly for the Campbells that Carrick Castle was built in the 14th century (Ewart and Dunn, 1997). It was certainly held for them from c.1500 to c.1685, when among the lands held were "Innermuch and Ardnanyne" (R.C.A.H.M.S. 1992: 235, No. 116). By then the inhabitants of "Ardnanyne" would worship at the established parish church.

It would not seem improbable, therefore, that during this period the Ardnahein site could have been neglected and that the stone now at Lochgoilhead might have been taken there from the earlier site. It is possible that the stone originally stood by a second, and later, interment pit to the north-east which is now covered with cobbles.

Dr. Colleen Batey reports that Mr. Robert Will, of Glasgow University Archaeological Research Division, identified the sherds from the original pit as

being from the wall base junction of a Throsk-type vessel dating to the 16th-18th centuries. Referring to the Throsk report by Caldwell and Dean (1992) she describes the sherd as "a common fabric particularly in the Paisley Abbey material". The west coast kilns of this type of pottery have still to be located.

The history of Ardnahein would tend to place the sherds in the 16th century or a little later.

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A TRADITIONAL TALE OF WILD BOAR ON LOCH LOMONDSIDE

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In common with most large native mammals which have long since disappeared from the Loch Lomond area, there is nothing available in the way of a written historical record relating to the former presence of Wild Boar *Sus scrofa*. The archaeological evidence provides a glimpse into the past, with the preserved tusks of the animal having been excavated from two peripheral sites - the Fairy Knowe broch in the upper Forth Valley (Main, 1999) and a crannog in the River Clyde near Dumbuck (Donnelly, 1898). On Loch Lomondside itself, the only bits and pieces on the Wild Boar which have been handed down for the natural historian to rake through are a few seemingly relevant place names and a little-known folk story from the 15th century.

Two lowland place names that would appear to have their origins in the Wild Boar's gaelic name of *cullaich* or *cullach* are Tamhully (*tom a'cullaich*) NS552876, meaning hillock of the boar, and the Muir of Kepculloch (*ceap cullach*) NS547903, which interestingly translates into the trap of the boar (Johnston, 1904). North of the Highland line, Lochan nam Muc NN341152, or lochan of the sow, is a high level site with a steepness of approach, a locality one would not readily associate with the keeping of domestic pigs.

The local traditional tale, which offers an alternative to the much repeated story of the Campbells of Argyll adopting a boar's head as their family crest from the legend of Diarmid and the Great Boar of Glen Elg, tells of the slaying of a particularly ferocious animal on Loch Lomondside by Duncan, son of Campbell of Lochow; the incident reputedly occuring sometime during the reign of James II, 1437-1460 (Wallace, 1899). The only detail about this equally colourful version of events which could be verified today is whether or not such a person as Duncan actually existed, to which the answer is yes. He was, in fact, the fourth son of Sir Duncan Campbell (d. 1453) of Lochow, ancestor to several branches of the powerful Campbell dynasty. Unfortunately, little seems to be known about Sir Duncan's son of the same name, beyond that he found favour in the King's eyes having rid of the countryside of a feared beast and was granted an estate at Kilmicheal Glassary in Argyll. The Campbell crest depicting a boar's head made its appearance about this time, after Duncan of Kilmicheal's nephew Colin Campbell was created the first Earl of Argyll in 1457 (Johnston, 1977).

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